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Attorney Docket No. IMMR067/04US

**PATENT**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of Louis B. ROSENBERG et al.

Serial No.: 10/730,067

Examiner: TBD

Confirmation No.: 2941

Art Unit: 2674

Filed: December 9, 2003

For: METHOD AND APPARATUS FOR STREAMING FORCE VALUES TO A  
FORCE FEEDBACK DEVICE

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**INFORMATION DISCLOSURE  
STATEMENT UNDER 37 C.F.R. §1.97(b)**

In accordance with the duty of disclosure set forth in 37 C.F.R. §1.56,

Applicant(s) hereby submits the following information in conformance with 37 C.F.R.  
§§1.97 and 1.98.

- ☐ Pursuant to 37 C.F.R. §1.98, a copy of each document cited in the attached Form PTO/SB/08 is enclosed.
- ☒ No copies of the publications listed on the attached Form PTO/SB/08A are being provided pursuant to 37 C.F.R. §1.98(d) because the publications were previously cited by or submitted to the Office in prior Application Serial No. 09/618,966 to which the above-identified application claims priority under 35 U.S.C. §120.
- ☐ Publication(s) \_\_\_ listed on the attached Form PTO/SB/08A were cited in a foreign search or examination report corresponding to \_\_\_ application serial no. \_\_\_ and mailed on \_\_\_.
- ☐ Enclosed is a copy of a non-English publication(s) \_\_\_. Pursuant to §609 of the M.P.E.P., Applicant submits the attached foreign search or examination report, which cites such non-English language publication(s).
- ☐ Enclosed is a copy of a non-English publication(s) \_\_\_. English language publication \_\_\_ (copy enclosed) claims priority from this non-English publication.

- ☐ Enclosed is an explanation of non-English publication(s) \_\_\_ for which an English translation is not available.
- ☐ Enclosed is an English translation of non-English publication(s) \_\_\_ cited in the attached Form PTO/SB/08A.
- ☐ Enclosed is a copy of pending patent Application Serial No. \_\_\_\_\_.

This Information Disclosure Statement is filed within any one of the following time periods:

- ☐ within three months from the filing date of this national application other than a CPA under 37 C.F.R. § 1.53(d);
- ☐ within three months from the date of entry of the national stage as set forth in 37 C.F.R. § 1.491 in this international application;
- ☒ before the mailing date of a first office action on the merits; or
- ☐ before the mailing of a first office action after the filing of a request for continued examination under 37 C.F.R. § 1.114.


It is respectfully requested that the Examiner consider the above-noted information and return an initialed copy of the attached Form PTO/SB/08A to the undersigned.

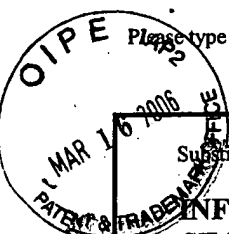
Dated: March 29, 2004

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COOLEY GODWARD LLP

By:

  
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Erik B. Milch  
Reg. No. 42,887



Please type a plus sign (+) inside this box → +

PTO/SB/08A (08-00)

Substitute for form 1449A/PTO <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> (use as many sheets as necessary)				<b>Complete if Known</b>			
Application Number		10/730,067					
Filing Date		December 9, 2003					
First Named Inventor		Louis B. ROSENBERG					
Group Art Unit		2674					
Examiner Name							
Sheet	1	of	3	Attorney Docket Number		IMMR-067/04US	

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. <sup>1</sup>	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY
		Number	Kind Code <sup>2</sup> (if known)		
	A1	5,785,630		Bobick, et al.	07/28/1998
	A2	5,766,016		Sinclair et al.	06/16/1998
	A3	5,547,382		Yamasaki et al.	08/20/1996
	A4	5,466,213		Hogan et al.	11/14/1995
	A5	5,334,027		Wherlock	08/02/1994
	A6	5,309,140		Everett, Jr., et al.	05/03/1994
	A7	5,299,810		Pierce et al.	04/05/1994
	A8	5,275,174		Cook	01/04/1994
	A9	5,271,290		Fischer	12/21/1993
	A10	5,240,417		Smithson et al.	08/31/1993
	A11	5,212,473		Louis	05/18/1993
	A12	5,078,152		Bond et al.	01/07/1992
	A13	5,038,089		Szaky	08/06/1991
	A14	5,035,242		Franklin et al.	07/30/1991
	A15	5,022,407		Horch et al.	06/11/1991
	A16	5,019,761		Kraft	05/28/1991
	A17	4,934,694		McIntosh	06/19/1990
	A18	4,930,770		Baker	06/05/1990
	A19	4,891,764		McIntosh	01/02/1990
	A20	4,794,392		Selinko	12/27/1988
	A21	4,713,007		Alban	12/15/1987
	A22	4,708,656		de Vries et al.	11/24/1987
	A23	4,599,070		Hladky et al.	07/08/1986
	A24	4,581,491		Boothroyd	04/08/1986
	A25	4,513,235		Acklam et al.	04/23/1985
	A26	4,236,325		Hall et al.	12/02/1980
	A27	4,160,508		Salisbury, Jr.	07/10/1979
	A28	3,911,416		Feder	10/07/1975
	A29	3,903,614		Diamond et al.	09/09/1975
	A30	3,902,687		Hightower	09/02/1975
	A31	3,623,064		Kagan	11/23/1971
	A32	3,517,446		Corlyon et al.	06/30/1970

<sup>1</sup> Unique citation designation number.

<sup>2</sup> See attached Kinds of U.S. Patent Documents.

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				First Named Inventor	Louis B. ROSENBERG
				Group Art Unit	2674
Examiner Name					
Sheet	2	of	3	Attorney Docket Number	IMMR-067/04US

	A33	3,497,668		Hirsch	02/24/1970
	A34	3,220,121		Cutler	11/30/1965
	A35	3,157,853		Hirsch	11/17/1964
	A36	4,374,399		Ensinger	02/1983
	A37	4,970,720		Esaki	11/1990
	A38	5,754,754		Dudley et al.	05/1998
	A39	5,812,554		Kadambi et al.	09/1998
	A40	5,854,786		Henderson et al.	12/1998
	A41	5,959,613		Rosenberg et al.	09/1999
	A42	5,968,197		Doiron	10/1999
	A43	5,990,875		Bi et al.	11/1999
	A44	6,278,439		Rosenberg et al.	08/2001
	A45	5,734,373		Rosenberg et al.	03/1998
	A46	5,587,937		Massie et al.	12/1996
	A47	5,742,278		Chen et al.	4/1998
	A48	6,300,937		Rosenberg	10/2001

#### FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	T <sup>4</sup>
		Office <sup>1</sup>	Number <sup>2</sup>	Kind Code <sup>3</sup> (if known)			
	B1		0 349 086	A1	Stork Kwant B.V.	01/03/1990	

#### OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	C1	Baigrie, "Electric Control Loading - A Low Cost, High Performance Alternative," <i>Proceedings of Interservice/Industry Training Systems Conference</i> , pp. 247-254, November 6-8, 1990	
	C2	Iwata, "Pen-based Haptic Virtual Environment," 0-7803-1363-1/93 IEEE, pp. 287-292, 1993	
	C3	Russo, "The Design and Implementation of a Three Degree of Freedom Force Output Joystick," <i>MIT Libraries Archives</i> pp. 1-131, May 1990, archived 8/14/90	
	C4	Brooks et al., "Hand Controllers for Teleoperation - A State-of-the-Art Technology Survey and Evaluation," <i>JPL Publication 85-11</i> , NASA-CR-175890; N85-28559, pp. 1-84, 03/1/1985	
	C5	Jones et al., "A perceptual analysis of stiffness," ISSN 0014-4819 Springer International (Springer-Verlag); <i>Experimental Brain Research</i> , Vol. 79, No. 1, pp. 150-156, 1990	
	C6	Burdea et al., "Distributed Virtual Force Feedback, Lecture Notes for Workshop on Force Display in Virtual Environments and its Application to Robotic Teleoperation," <i>1993 IEEE International Conference on Robotics and Automation</i> , pp. 25-44, 05/02/1993	
	C7	Snow et al., "Model-X Force-Reflecting-Hand-Controller," NT Control No. NPO-17851; JPL Case No. 7348, pp. 1-4 with 45 pages of attachments, 06/15/1989	
	C8	Ouh-Young, "Force Display in Molecular Docking," Doctoral Dissertation, University of North Carolina at Chapel Hill, UMI Order No. 9034744, p. 1-369, 1990	

<sup>1</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3).

<sup>2</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document.

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Sheet	3	of	3	Attorney Docket Number	IMMR-067/04US

	C9	Tadros, "Control System Design for a Three Degree of Freedom Virtual Environment Simulator Using Motor/Brake Pair Actuators," <i>MIT Archive</i> , pp. 1-88, February 1990, archived 8/13/90	
	C10	Caldwell et al., "Enhanced Tactile Feedback (Tele-Taction) Using a Multi-Functional Sensory System," 1050-4729/93, pp. 955-960, 1993	
	C11	Adelstein et al., "Design and Implementation of a Force Reflecting Manipulandum for Manual Control research," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 1-12, 1992	
	C12	Gotow et al., "Controlled Impedance Test Apparatus for Studying Human Interpretation of Kinesthetic Feedback," WAI1-11:00, pp. 332-337	
	C13	Stanley et al., "Computer Simulation of Interacting Dynamic Mechanical Systems Using Distributed Memory Parallel Processors," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 55-61, ASME 1992	
	C14	Russo, "Controlling Dissipative Magnetic Particle Brakes in Force Reflective Devices," DSC-Vol. 42, <i>Advances in Robotics</i> , pp. 63-70, ASME 1992	
	C15	Kontarinis et al., "Display of High-Frequency Tactile Information to Teleoperators," <i>Telemanipulator Technology and Space Telerobotics</i> , Won S. Kim, Editor, Proc. SPIE Vol. 2057, pp. 40-50, Sep. 7-9, 1993	
	C16	Patrick et al., "Design and Testing of A Non-reactive, Fingertip, Tactile Display for Interaction with Remote Environments," <i>Cooperative Intelligent Robotics in Space</i> , Rui J. deFigueiredo et al, Editor, Proc. SPIE Vol. 1387, pp. 215-222, 1990	
	C17	Adelstein, "A Virtual Environment System For The Study of Human Arm Tremor," <i>Ph.D. Dissertation</i> , Dept. of Mechanical Engineering, MIT, June 1989, archived 3/13/90	
	C18	Bejczy, "Sensors, Controls, and Man-Machine Interface for Advanced Teleoperation," <i>Science</i> , Vol. 208, No. 4450, pp. 1327-1335, 1980	
	C19	Bejczy et al., "Generalization of Bilateral Force-Reflecting Control of Manipulators," <i>Proceedings Of Fourth CISM-IFTOMM</i> , Sep. 8-12, 1981	
	C20	McAfee et al., "Teleoperator Subsystem/Telerobot Demonstrator. Force Reflecting Hand Controller Equipment Manual," <i>JPL</i> 1988, JPL D-5172	
	C21	Minsky, "Computational Haptics: The Sandpaper System for Synthesizing Texture for a Force-Feedback Display," <i>Ph.D. Dissertation</i> , MIT, June 1995, archived 7/6/95	
	C22	Jacobsen et al., "High Performance, Dextrous Telerobotic Manipulator With Force Reflection," <i>Intervention/ROV '91 Conference &amp; Exposition</i> , Hollywood, Florida, May 21-23, 1991	
	C23	Shimoga, "Finger Force and Touch Feedback Issues in Dexterous Telemanipulation," <i>Proceedings of Fourth Annual Conference on Intelligent Robotic Systems for Space Exploration</i> , Rensselaer Polytechnic Institute, Sep. 30- Oct. 1, 1992	
	C24	IBM Technical Disclosure Bulletin, "Mouse Ball-Actuating Device With Force and Tactile Feedback," Vol. 32, No. 9B, February 1990	
	C25	Terry et al., "Tactile Feedback In A Computer Mouse," <i>Proceedings of Fourteenth Annual Northeast Bioengineering Conference</i> , University of New Hampshire, March 10-11, 1988	
	C26	Howe, "A Force-Reflecting Teleoperated Hand System for the Study of Tactile Sensing in Precision Manipulation," <i>Proceedings of the 1992 IEEE International Conference on Robotics and Automation</i> , Nice, France, May 1992	
	C27	Eberhardt et al., "OMAR - A Haptic display for speech perception by deaf and deaf-blind individuals," <i>IEEE Virtual Reality Annual International Symposium</i> , Seattle, WA, Sep. 18-22, 1993	
	C28	Rabinowitz et al., "Multidimensional tactile displays: Identification of vibratory intensity, frequency, and contractor area," <i>Journal of The Acoustical Society of America</i> , Vol. 82, No. 4, October 1987	
	C29	Bejczy et al., "Kinesthetic Coupling Between Operator and Remote Manipulator," <i>International Computer Technology Conference, The American Society of Mechanical Engineers</i> , San Francisco, CA, August 12-15, 1980	
	C30	Bejczy et al., "A Laboratory Breadboard System For Dual-Arm Teleoperation," <i>SOAR '89 Workshop</i> , JSC, Houston, TX, July 25-27, 1989	
	C31	Ouhyoung et al., "A Low-Cost Force Feedback Joystick and Its Use in PC Video Games," <i>IEEE Transactions on Consumer Electronics</i> , Vol. 41, No. 3, August 1995	
	C32	Marcus, "Touch Feedback in Surgery," <i>Proceedings of Virtual Reality and Medicine The Cutting Edge</i> , Sep. 8-11, 1994	
	C33	Bejczy, et al., "Universal Computer Control System (UCCS) For Space Telerobots," CH2413-3/87/0000/0318501.00 1987 IEEE, 1987	

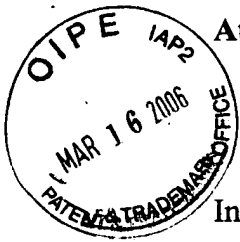
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<sup>1</sup> Unique citation designation number.

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Attorney Docket No. IMMR-067/04US

**COPY**  
PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of Louis B. ROSENBERG *et al.*

Serial No.: 10/730,067

Examiner: Unassigned

Filed: December 9, 2003

Art Unit: 2674

Confirmation No. 2941

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- ☐ No copies of any U.S. patents or U.S. patent application publications listed on the attached Form PTO/SB/08A are being provided pursuant to 37 C.F.R. §1.98 because this application was filed after June 30, 2003.
- ☐ Publication(s) \_\_\_ listed on the attached Form PTO/SB/08A were cited in a foreign search or examination report corresponding to \_\_\_ application serial no. \_\_\_ and mailed on \_\_\_.
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Dated: October 13, 2004

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By: \_\_\_\_\_

  
Erik B. Milch  
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(1 of 2)

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**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**

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Sheet **1** of **3****Complete If Known**

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First Named Inventor	Louis B. Rosenberg
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Examiner Name	Unassigned
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		Number	Kind Code <sup>2</sup> (if known)			
		6,422,941		7/23/2002	Thomer et al.	
		6,160,489		12/12/2000	Perry et al.	
		6,111,577		8/29/2000	Zilles et al.	
		5,690,582		11/25/1997	Ulrich et al.	
		5,575,761		11/19/1996	Hajianpour	
		5,437,607		8/1/1995	Taylor	
		5,436,622		7/25/1995	Gutman et al.	
		5,283,970		2/8/1994	Aigner	
		5,186,695		2/16/1993	Mangseth et al.	
		5,175,459		12/29/1992	Danial et al.	
		5,165,897		11/24/1992	Johnson	
		5,022,384		6/11/1991	Freels	
		4,885,565		12/5/1989	Embach	
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		4,464,117		8/7/1984	Foerst	
		4,333,070		6/1/1982	Barnes	
		4,262,549		4/21/1981	Schwellenbach	
		4,127,752		11/28/1978	Lowthorp	
		2,972,140		2/14/1961	Hirsch	

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		JP	H2-185278		7/19/1990	Taito Corporation	
		JP	H4-8381		1/13/1992	Epoch Co. and Key- Planning Co.	
		JP	H7-24147		1/27/1995	Sega Corporation	
		JP	H5-192449		8/3/1993	Taito Corporation	

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Examiner Name	Unassigned
Attorney Docket Number	IMMR067/04US

**OTHER PRIOR ART -- NON PATENT LITERATURE DOCUMENTS**

Examiner Initials *	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
		PATRICK, "Design, Construction, and Testing of a Fingertip Tactile Display for Interaction with Virtual and Remote Environments," <i>Master of Science Thesis</i> , MIT, Aug. 1990, archived Nov. 8, 1990.
		CALDER, "Design of A Force-Feedback Touch-Introducing Actuator For Teleoperator Robot Control," <i>Bachelor of Science Thesis</i> , MIT, May 1983, archived June 23, 1983.
		WIKER, "Teletouch Display Development: Phase 1 Report," <i>Technical Report 1230</i> , Naval Ocean Systems Center, San Diego, July 1988.
		BLISS, "Optical-to-Tactile Image Conversion for the Blind," <i>IEEE Transactions on Man-Machine Systems</i> , Vol. MMS-11, No. 1, March 1970.
		JOHNSON, "Shape-Memory Alloy Tactile Feedback Actuator," <i>Armstrong Aerospace Medical Research Laboratory</i> , AAMRL-TR-90-039, August, 1990.
		KONTARINIS et al., "Tactile Display of Vibratory Information in Teleoperation and Virtual Environments," <i>PRESENCE</i> , 4(4):387-402, Harvard Univ., 1995.
		AUKSTAKALNIS et al., "Silicon Mirage: The Art and Science of Virtual Reality," ISBN 0-938151-82-7, pp. 129-180, 1992.
		EBERHARDT et al., "Inducing Dynamic Haptic Perception by The Hand: System Description and Some Results," <i>DSC-Vol. 55-1, Dynamic Systems and Control: Volume 1</i> , ASME 1994.
		GOBEL et al., "Tactile Feedback Applied to Computer Mice," <i>International Journal of Human-Computer Interaction</i> , Vol. 7, No. 1, pp. 1-24, 1995.
		PIMENTEL et al., "Virtual Reality: through the new looking glass," 2 <sup>nd</sup> Edition; McGraw-Hill, ISBN 0-07-050167-X, pp. 41-202, 1994.
		"Cyberman Technical Specification," <i>Logitech Cyberman SWIFT Supplement to Logitech Mouse Technical Reference and Programming Guide</i> , 4/5/1994.
		OUHYOUNG et al., "The Development of A Low-Cost Force Feedback Joystick and Its Use in the Virtual Reality Environment," <i>Proceedings of the Third Pacific Conference on Computer Graphics and Applications, Pacific Graphics '95</i> , Seoul, Korea, 21-24 August 1995.
		KACZMAREK et al., "Tactile Displays," <i>Virtual Environment Technologies</i> , Chap. 9, pp. 349-414.
		LAKE, "Cyberman from Logitech," at <a href="http://www.ibiblio.org/GameBytes/issue21/greviews/cyberman.html">http://www.ibiblio.org/GameBytes/issue21/greviews/cyberman.html</a> , 1994.
		"Component Maintenance Manual With Illustrated Parts List, Coaxial Control Shaker Part No. C-25502," Safe Flight Instrument Corporation, Revised 28 January 2002 (3 pages).

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**Complete if Known**

Application Number	10/730,067
Filing Date	December 9, 2003
First Named Inventor	Louis B. Rosenberg
Art Unit	2674
Examiner Name	Unassigned
Attorney Docket Number	IMMR067/04US

## OTHER PRIOR ART – NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.
		"Technical Manual Overhaul Instructions With Parts Breakdown, Coaxial Control Shaker Part No. C-25502," Safe Flight Instrument Corporation, Revised 15 July 1980 (23 pages).
		SCANNELL, "Taking a Joystick Ride," <i>Computer Currents</i> , Boston Edition, Vol. 9, No. 11, November 1994
		ROSENBERG, "Virtual Fixtures: Perceptual Overlays Enhance Operator Performance In Telepresence Tasks," <i>Ph.D. Dissertation</i> , Stanford University, June 1994.

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Sheet **1** of **11****Complete if Known**

Application Number	10/730,067
Filing Date	December 9, 2003
First Named Inventor	Louis B. Rosenberg
Art Unit	2674
Examiner Name	Unassigned
Attorney Docket Number	IMMR067/04US

**U.S. PATENT DOCUMENTS**

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		Number Kind Code <sup>2</sup> (if known)			
		2002/0030663	03-2002	Tierling et al.	
		2,832,073	04-1958	Arkus et al.	
		2,906,179	09-1959	Bower	
		3,490,059	01-1970	Paulsen et al.	
		3,531,868	10-1970	Stevenson	
		3,659,284	04-1972	Rusch	
		3,863,098	01-1975	Mehr	
		3,875,488	04-1975	Crocker et al.	
		3,890,958	06-1975	Fister et al.	
		3,919,691	11-1975	Noll	
		3,944,798	03-1976	Eaton	
		4,125,800	11-1978	Jones	
		4,148,014	04-1979	Burson	
		4,216,467	08-1980	Colston	
		4,398,889	08-1983	Lam et al.	
		4,448,083	05-1984	Hayashi	
		4,477,043	10-1984	Repperger	
		4,477,973	10-1984	Davies	
		4,550,221	10-1985	Mabuth	
		4,550,617	11-1985	Fraignier et al.	
		4,560,983	12-1985	Williams	
		4,571,834	02-1986	Fraser et al.	
		4,593,470	06-1986	Davies	
		4,601,206	07-1986	Watson	
		4,604,016	08-1986	Joyce	
		4,632,341	12-1986	Repperger et al.	
		4,638,798	01-1987	Shelden et al.	
		4,653,011	03-1987	Iwano	
		4,654,648	03-1987	Herrington et al.	
		4,676,002	06-1987	Slocum	
		4,679,331	07-1987	Koontz	
		4,688,983	08-1987	Lindbom	
		4,703,443	10-1987	Moriyasu	
		4,704,909	11-1987	Grahn et al.	
		4,750,487	06-1988	Zanetti	

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Sheet **2** of **11****Complete if Known**

Application Number	10/730,067
Filing Date	December 9, 2003
First Named Inventor	Louis B. Rosenberg
Art Unit	2674
Examiner Name	Unassigned
Attorney Docket Number	IMMR067/04US

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		Number Kind Code <sup>2</sup> (if known)			
		4,769,763	09-1988	Trieb et al.	
		4,787,051	11-1988	Olson	
		4,791,934	12-1988	Brunnett	
		4,798,919	01-1989	Miessler et al.	
		4,800,721	01-1989	Cemenska et al.	
		4,803,413	02-1989	Kendig et al.	
		4,811,608	03-1989	Hilton	
		4,819,195	04-1989	Bell et al.	
		4,839,838	06-1989	LaBiche et al.	
		4,849,692	07-1989	Blood	
		4,879,556	11-1989	Dulmel	
		4,888,877	12-1989	Enderle et al.	
		4,891,889	01-1990	Tomelleri	
		4,907,970	03-1990	Meenen, Jr.	
		4,907,973	03-1990	Hon	
		4,942,545	07-1990	Sapia	
		4,945,305	07-1990	Blood	
		4,945,501	07-1990	Bell et al.	
		4,949,119	08-1990	Moncrief et al.	
		4,961,138	10-1990	Gorniak	
		4,961,267	10-1990	Herzog	
		4,962,591	10-1990	Zeller et al.	
		4,982,504	01-1991	Soderberg et al.	
		4,983,786	01-1991	Stevens et al.	
		5,007,085	04-1991	Greanias et al.	
		5,007,300	04-1991	Siva	
		5,012,231	04-1991	Felsenstein	
		5,040,306	08-1991	McMurtry et al.	
		5,044,956	09-1991	Behensky et al.	
		5,050,608	09-1991	Watanabe et al.	
		5,072,361	12-1991	Davies et al.	
		5,088,046	02-1992	McMurtry et al.	
		5,088,055	02-1992	Oyama	
		5,095,303	03-1992	Clark et al.	
		5,103,404	04-1992	McIntosh	

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Sheet **3** of **11****Complete if Known**

Application Number	10/730,067
Filing Date	December 9, 2003
First Named Inventor	Louis B. Rosenberg
Art Unit	2674
Examiner Name	Unassigned
Attorney Docket Number	IMMR067/04US

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		5,107,080	04-1992	Rosen	
		5,116,051	05-1992	Moncrief et al.	
		5,126,948	06-1992	Mitchell et al.	
		5,128,671	07-1992	Thomas, Jr.	
		5,131,844	07-1992	Marinaccio et al.	
		5,132,672	07-1992	Clark	
		5,139,261	08-1992	Openiano	
		5,142,506	08-1992	Edwards	
		5,142,931	09-1992	Menahem	
		5,143,505	09-1992	Burdea et al.	
		5,148,377	09-1992	McDonald	
		5,153,884	10-1992	Lucak et al.	
		5,178,012	01-1993	Culp	
		5,181,181	01-1993	Glynn	
		5,182,557	01-1993	Lang	
		5,184,306	02-1993	Erdman et al.	
		5,184,319	02-1993	Kramer	
		5,185,561	02-1993	Good et al.	
		5,186,629	02-1993	Rohen	
		5,187,874	02-1993	Takahashi et al.	
		5,189,806	03-1993	McMurtry et al.	
		5,197,003	03-1993	Moncrief et al.	
		5,203,563	04-1993	Loper, III	
		5,204,824	04-1993	Fujimaki	
		5,209,131	05-1993	Baxter	
		5,220,260	06-1993	Schuler	
		5,223,776	06-1993	Radke et al.	
		5,228,356	07-1993	Chuang	
		5,230,623	07-1993	Guthrie et al.	
		5,243,266	09-1993	Kasagami et al.	
		5,251,127	10-1993	Raab	
		5,251,156	10-1993	Heier et al.	
		5,259,120	11-1993	Chapman et al.	
		5,259,894	11-1993	Sampson	
		5,262,777	11-1993	Low et al.	

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Application Number

10/730,067

Filing Date

December 9, 2003

First Named Inventor

Louis B. Rosenberg

Art Unit

2674

Examiner Name

Unassigned

Attorney Docket Number

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		5,264,768		11-1993	Gregory et al.	
		5,275,565		01-1994	Moncrief	
		5,289,273		02-1994	Lang	
		5,296,846		03-1994	Ledley	
		5,296,871		03-1994	Paley	
		5,351,692		10-1994	Dow et al.	
		5,354,162		10-1994	Burdea et al.	
		5,379,663		01-1995	Hara	
		5,384,460		01-1995	Tseng	
		5,389,865		02-1995	Jacobus et al.	
		5,396,266		03-1995	Brimhall	
		5,396,267		03-1995	Bouton	
		5,397,323		03-1995	Taylor et al.	
		5,402,582		04-1995	Raab	
		5,405,152		04-1995	Katanics et al.	
		5,412,880		05-1995	Raab	
		5,414,337		05-1995	Schuler	
		5,417,696		05-1995	Kashuba et al.	
		5,428,748		06-1995	Davidson et al.	
		5,429,140		07-1995	Burdea et al.	
		5,436,542		07-1995	Petellin et al.	
		5,436,640		07-1995	Reeves	
		5,445,166		08-1995	Taylor	
		5,451,924		09-1995	Massimino et al.	
		5,459,382		10-1995	Jacobus et al.	
		5,467,763		11-1995	McMahon et al.	
		5,482,051		01-1996	Reddy et al.	
		5,512,919		04-1996	Araki	
		5,513,100		04-1996	Parker et al.	
		5,517,507		05-1996	Needham et al.	
		5,551,701		09-1996	Bouton et al.	
		5,570,111		10-1996	Barrett et al.	
		5,576,727		11-1996	Rosenberg et al.	
		5,587,937		12-1996	Massie et al.	
		5,589,828		12-1996	Armstrong	

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Sheet **5** of **11****Complete If Known**

Application Number	10/730,067
Filing Date	December 9, 2003
First Named Inventor	Louis B. Rosenberg
Art Unit	2674
Examiner Name	Unassigned
Attorney Docket Number	IMMR067/04US

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		5,589,854	12-1996	Tsai	
		5,591,924	01-1997	Hilton	
		5,623,582	04-1997	Rosenberg	
		5,625,576	04-1997	Massie et al.	
		5,629,594	05-1997	Jacobus et al.	
		5,634,794	06-1997	Hildreth et al.	
		5,642,469	06-1997	Hannaford et al.	
		5,643,087	07-1997	Marcus et al.	
		5,656,901	08-1997	Kurita	
		5,666,473	09-1997	Wallace	
		5,680,322	10-1997	Shinoda	
		5,691,898	11-1997	Rosenberg et al.	
		5,694,013	12-1997	Stewart et al.	
		5,696,535	12-1997	Rutledge et al.	
		5,709,219	01-1998	Chen et al.	
		5,721,566	02-1998	Rosenberg et al.	
		5,731,804	03-1998	Rosenberg	
		5,734,373	03-1998	Rosenberg et al.	
		5,739,811	04-1998	Rosenberg et al.	
		5,742,278	04-1998	Chen et al.	
		5,755,577	05-1998	Gillio	
		5,767,839	06-1998	Rosenberg	
		5,790,108	08-1998	Salcudean et al.	
		5,802,353	09-1998	Avila et al.	
		5,889,670	03-1999	Schuler et al.	
		5,897,437	04-1999	Nishiumi et al.	
		6,278,439	08-2001	Rosenberg et al.	

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		Country Code <sup>3</sup>	Number <sup>4</sup>	Kind Code <sup>5</sup> (if known)			
		JP	4-34610				
		GB	2254911				
		WO	9502801				
		WO	9642078				
		EP	0626634	A2			

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Sheet **6** of **11****Complete If Known**

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First Named Inventor	Louis B. Rosenberg
Art Unit	2674
Examiner Name	Unassigned
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		WO	9532459				
		WO	9712357				
		WO	9720305				
		WO	9721160				
		WO	9731333				

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Sheet **7** of **11****Complete if Known**

Application Number	10/730,067
Filing Date	December 9, 2003
First Named Inventor	Louis B. Rosenberg
Art Unit	2674
Examiner Name	Unassigned
Attorney Docket Number	IMMR067/04US

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		Cursor Walso, "Designer's Corner-Useful Technology for Your Idea File," Design News, Mar. 7, 1993, p. 63.
		"Foot-Operated Mouse," IBM Technical Disclosure Bulletin, Apr. 1986, vol. 28, No. 11.
		"High Performance Model of the Immersion Probe," Immersion Probe-MD.TM., Immersion Human Interface Corporation.
		"High Performance Model of the Immersion Probe." Immersion Probe-MD™, Immersion Corporation (1994).
		"Proceedings of the IFIP Congress 65," International Federation for Information Processing, Information Processing 1965, vol. 3, New York, May 24-29, 1965, pp. 506
		"The Personal Digitizer.TM.," Immersion Human Interface Corporation 1994.
		"Useful Technology for Your Idea File," Design News, Mar. 7, 1994, pp. 63.
		3D Human Interface Tool, Immersion Probe.TM., Immersion Human Interface Corporation 1994.
		Adachi, Yoshitaka et al., "Sensory Evaluation of Virtual Haptic Push-Buttons," Technical Research Center, Suzuki Motor Corporation, Nov. 1994.
		Adelstein Bernard D. et al., "A High Performance Two Degree-of-Freedom Kinesthetic Interface," Massachusetts Institute of Technology 1992, pp. 108-112.
		Atkinson, William D. et al, "Computing with Feeling," Comput. & Graphics, vol. 2, No. 2-E, pp. 97-103.
		Batter, James J. et al., "Grove-1: A Computer Display to the Sense of Feel," pp. TA-4-188-TA-4-192.
		Bejczy, Antal K., "The Phantom Robot: Predictive Displays for Teleoperation with Time Delay," IEEE 1990, pp. 546-550.
		Burdea, Grigore et al., "A Portable Dextrous Master with Force Feedback," Presence: Teleoperators and Virtual Environments, MIT Press, Jun. 1991.
		Burdea, Grigore et al., "Dextrous Telerobotics with Force Feedback-An Overview," Robotica 1991, vol. 9.

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		Buttolo, Pietro et al., "Pen-Based Force Display for Precision Manipulation in Virtual Environments," IEEE Mar. 1995, pp.1-8.	
		Colgate J. Edward et al., Implementation of Stiff Virtual Walls in Force-Reflecting Interfaces, Sep. 22, 1993.	
		Ellis, R.E. et al., "Design and Evaluation of a High-Performance Prototype Planar Haptic Interface," ASME Dec. 3, 1993, DSC-vol. 49, pp. 55-64.	
		Fischer, Patrick et al., "Specification and Design of Input Devices for Teleoperation," 1990.	
		Fisher, S.S. et al., "Virtual Environment Display System," ACM Interactive 3D Graphics, Oct. 1986.	
		Gotow, J.K., et al., "Preception of Mechanical Properties at the Man-Machine Interface," IEEE 1987, pp. 688-689.	
		Hannaford, Blake et al., "Performance Evaluation of a Six-Axis Generalized Force-Reflecting Teleoperator," IEEE May/Jun. 1991, vol. 21, No. 3, pp. 620-633.	
		Hasser, Christopher John, "Tactile Feedback for a Force-Reflecting Haptic Display," The School of Engineering, University of Dayton, Dec. 1995, pp. iii-xii & 1-96.	
		Herndon, J.N. et al., "The State-of-the-Art Model M-2 Maintenance System," Proceedings of the 1984 National Topical Meeting on Robotics and Remote Handling in Hostile Environments, American Nuclear Society, pp. 59-65.	
		Howe, Robert D., "Task Performance with a Dextrous Teleoperated Hand System," Proceedings of SPIE, Nov. 1992, vol. 1833, pp. 1-9.	
		Iwata, H., "Artificial Reality with Force Feedback: Development of Desktop Virtual Space with Compact Master Manipulator," Computer Graphics, vol. 24, No. 4, 1990, pp. 165-170.	
		Iwata, Hiroo et al, Volume Haptization, IEEE 1993, pp. 16-18.	
		Jacobsen, S.C. et al., "High Performance, High Dexterity, Force Reflective Teleoperator II," ANS Topical Meeting on Robotics & Remote Systems, Albuquerque, New Mexico Feb. 24-27, 1991, pp. 1-10.	
		Kelley, A.J. et al., "MagicMouse: Tactile and Kinesthetic Feedback in the Human-Computer Interface Using an Electromagnetically Actuated Input/Output Device," Dept. of Elec. Engineering, Univ. of British Columbia, 1993, pp. 1-27.	

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11

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Application Number

10/730,067

Filing Date

December 9, 2003

First Named Inventor

Louis B. Rosenberg

Art Unit

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Examiner Name

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		Kilpatrick, Paul Jerome, 1947, "The Use of a Kinesthetic Supplement in an Interactive Graphics System", Xerox University Microfilms, Ann Arbor, Michigan 48106, 1976, pp. 1-175.
		Kim, Won S. et al., "Graphics Displays for Operator Aid in Telemanipulation," IEEE 1991, pp. 1059-1067.
		Kim, Won S. et al., A Teleoperation Training Simulator with Visual and Kinesthetic Force Virtual Reality.
		Kotoku, Tetsuo et al., "Environment Modeling for the Interactive Display (EMID) Used in Telerobotic Systems," IEEE Nov. 3-5, 1991, pp. 99-1004.
		Kotoku, Tetsuo, "A Predictive Display with Force Feedback and its Application to Remote Manipulation System with Transmission Time Display," IEEE 1992, Jul. 7-10, 1992, pp. 239-246.
		Krueger, Myron W., Artificial Reality 1988, pp. 54-75.
		Meyer, Kenneth et al., "A Survey of Position Trackers," The Massachusetts Institute of Technology 1992, Presence, vol. 1, No. 2.
		Minsky, Margaret et al., "Feeling and Seeing: Issues in Force Display," ACM 1990, pp. 235-242.
		Noll, A. Michael, "Man-Machine Tactile Communication Dissertation," Polytechnic Institute of Brooklyn, Jun. 1971, pp. 1-88.
		Ouh-young, M. et al., "Creating an Illusion of Feel: Control Issues in Force Display," Computer Science Dept., Univ. of North Carolina, 1989, pp. 1-14.
		Ouh-young, Ming et al., "Force Display Performs Better than Visual Display in a Simple 6-D Docking Task," IEEE 1989, pp. 1462-1466.
		Ouh-Young, Ming et al., "Using a Manipulator for Force Display in Molecular Docking," IEEE 1988, pp. 1824-1829.
		Repperger, D.W., "Active Force Reflection Devices in Teleoperation", IEEE Control Systems, 1991, pp. 52-56.
		Rosenberg et al., "The use of force feedback to enhance graphical user interfaces," Stereoscopic Displays and Virtual Reality Systems III, Proc. SPIE 2653, 1996, pp. 243-248.

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		Rosenberg, L.B., "Commercially Viable Force Feedback Controller for Individuals with Neuromotor Disabilities", AL/CF-TR-1997-0016, United States Air Force Armstrong Laboratory, May 1996.
		Rosenberg, Louis B. et al., "Perceptual Decomposition of Virtual Haptic Surfaces," IEEE, Oct. 1993.
		Rosenberg, Louis B., "Perceptual Design of a Virtual Rigid Surface Contact," Center for Design Research Stanford University, Air Force Material Command, Apr. 1993, pp. 1-41.
		Rosenberg, Louis B., "The Use of Virtual Fixtures as Perceptual Overlays to Enhance Operator Performance in Remote Environments," Air Force Material Command, Sep. 1992, pp. 1-42.
		Rosenberg, Louis B., "Virtual Fixtures as Tools to Enhance Operator Performance in Telepresence Environments," SPIE Telemanipulator Technology, 1993.
		Rosenberg, Louis B., "Virtual Haptic Overlays Enhance Performance in Telepresence Tasks," SPIE 1994.
		Rosenberg, Louis B., Crew Systems Directorate Biodynamics and Biocommunications Division Wright-Patterson, Air Force Material Command, Mar. 1993, pp. 1-45.
		Rosenberg, Louis B., The Use of Virtual Fixtures to Enhance Operator Performance in Time Delayed Teleoperation, Armstrong Laboratory, Mar. 1993, pp. 1-45.
		Schmult, Brian et al., "Application Areas for a Force-Feedback Joystick," ASME 1993, DSC-vol. 49, pp. 47-54.
		Smith, Geoffrey, "Call It Palpable Progress," Business Week, Oct. 9, 1995, pp. 93, 96.
		Snow, E. et al., "Compact Force-Reflecting Hand Controller," JPL, Apr. 1991, vol. 15, No. 3, Item No. 153, pp. 1-15a.
		Su, S. Augustine et al., "The Virtual Panel Architecture: A 3D Gesture Framework," IEEE 1993, pp. 387-393.
		Tan, H. et al., "Manual Resolution of Compliance When Work and Force Cues are Minimized," ASME 1993, DSC--vol. 49, pp. 99-104.
		Tan, Hong Z. et al., "Human Factors for the Design of Force-Reflecting Haptic Interfaces," Tan, Srinivasan, Eberman, & Chang, ASME WAM 1994, pp. 1-11.

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		Tavkhelidze, D.S. "Kinematic Analysis of Five-Link Spherical Mechanisms," Mechanism and Machine Theory 1974, vol. 9, pp. 181-190.	
		Wiker, Steven F. et al., "Development of Tactile Mice for Blind Access to Computers: Importance of Stimulation Locus, Object Size, and Vibrotactile Display Resolution," Proceedings of the Human Factors Society 35th Annual Meeting 1991, pp. 708-712.	
		Winey III, Calvin McCoy, "Computer Simulated Visual and Tactile Feedback as an Aid to Manipulator and Vehicle Control," MIT, Jun. 1981.	
		Yamakita, M. et al., Tele-Virtual Reality of Dynamic Mechanical Model, IEEE Jul. 7-10, 1992, pp. 1103-1110.	
		Yokokohji, Y., "What You Can See is What You Can Feel--Development of a Visual/Haptic Interface to Virtual Environment," Proc. of VRAIS '96, IEEE 0-8186-7295-1, 1996, pp. 46-54.	

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